University of Colorado

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FINAL TECHNICAL REPORT

NASA CONTRACT NAG 5-1000

PRINCIPAL INVESTIGATOR: Richard McCray

In this work, we obtained IUE spectroscopic observations of the binary X-ray source 4U0900 - 40 to search for pulsations in the UV absorption lines formed in the stellar winds that had been predicted by McCray and Hatchett. The observations with the IUE satellite did not show the pulsations that we were looking for. We analyzed the data and constructed a quantitative model for the expected level of pulsations. There is a significant and interesting discrepancy between the theoretically expected results and the observed results. The discrepancy might be explained if the X-ray source happened to be in a low state during the time of the IUE observations (we did not have simultaneous X-ray observations).

We published the new theoretical calculations and the results of the observations in the refereed paper listed below.

We asked the IUE director for discretionary time to try again, using a new technique. We were granted the time and carried out the observations, but once again obtained a null result.

On the basis of this interesting discrepancy between theory and observation, we wrote a proposal to observe this source once again with the Hubble Space Telescope, which is much more powerful and can hardly fail to see the theoretically predicted effect. The proposal was successful, and we now have been granted a general observer program with high priority.

A graduate student (Mark Voit) participated in this work. He has since finished his Ph.D. dissertation and is now a postdoc at Caltech.

PUBLICATION SUPPORTED BY THIS GRANT

T. Kallman, R. McCray, and M. Voit, "Rapid Variability of P-Cygni Lines in Massive X-ray Binaries," Astrophys. J., **317**, 746 - 749 (1987).

Richard McCray